

Sandia National Laboratories

Albuquerque, New Mexico 87185

November 15, 1987

Neil M. Coleman
Hydrology Section
Geotechnical Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Spring, MD 20910

Dear Mr. Coleman:

Enclosed is the monthly report for October 1987 for FIN A1158. If you have any questions or comments, please feel free to contact me at (FTS) 844-8368 or Charlene Harlan at (FTS) 844-8164.

Sincerely,

Robert M. Cranwell

Robert M. Cranwell, Supervisor
Waste Management Systems
Division 6416

RMC:6416

Enclosures

Copy to:

Office of the Director, NMSS
Attn: Program Support
Robert Browning, Director
Division of Waste Management
Philip Justus
Division of Waste Management
Ronald L. Ballard, Branch Chief
Division of High-Waste Management
John Randall
Division of Radiation Programs and
Earth Sciences

6410 N. R. Ortiz
6416 R. M. Cranwell
6416 P. A. Davis
6416 C. P. Harlan
6416 G. F. Wilkinson

87335440
WM Project: WM-10, 11, 16
PDR w/encl
(Return to WM, 623-SS)

WM Record File: A1158
LPDR w/encl

H

8712170173 871115
PDR WMRES EXISANL
A-1158 PDR

MANAGEMENT ISSUES

The current Statement of Work closed A1158 on September 30, 1987. Our approximate carryover into FY 88 is \$82K. It is our understanding per a letter from the A1158 Program Manager dated October 6, 1987, that a no-cost extension was requested in an NRC Form 173 September 29, 1987, to continue this project until December 31, 1987.

PROGRAM: Task I, Technology Transfer

FIN A1158

CONTRACTOR: Sandia National Laboratories

BUDGET PERIOD: 10/87 -
12/87

NMSS PROGRAM MANAGER: N. M. Coleman

BUDGET AMOUNT: \$ 0 K

CONTRACT PROGRAM MANAGER: R. M. Cranwell

FTS PHONE: 844-8368

PRINCIPAL INVESTIGATOR: C. P. Harlan

FTS PHONE: 844-8164

PROJECT OBJECTIVE

To provide technical support for the transfer of the capability to use the information, analytical techniques, and tools developed for the NRC under the Performance Assessment Methodology program (FIN A-1266).

ACTIVITIES DURING OCTOBER 1987

The NEFTRAN User's Manual, NUREG/CR-4766 was printed and distributed during October. This work has been funded jointly by A1158 and A1266 (NRC/NRR).

The TOUGH User's Guide, NUREG/CR-4645 was printed at the NRC and distributed during October.

This completes all work under Task I.

FIN A1158, Task I, Technology Transfer
 Subcase 0976.020
 OCTOBER 1987

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date -----
I. Direct Manpower (man-months of charged effort)	0.0 ---	0.0 ---
II. Direct Loaded Labor Costs	1	1
Materials and Services	0	0
ADP Support (computer)	0	0
Subcontracts	0	0
Travel	0	0
Other (computer roundoff)	0	0
G & A	0	0
	-----	-----
TOTAL COSTS	1	1

III. Funding Status

Prior FY Carryover -----	FY 88 Projected Funding Level -----	FY 88 Funds Received to Date -----	FY 88 Funding Balance Needed -----
\$ OK	\$ OK	\$ OK	\$ OK

PROGRAM: Task II, Maintenance of Computer Codes

FIN A1158

CONTRACTOR: Sandia National Laboratories

BUDGET PERIOD: 10/87 -
12/87

NMSS PROGRAM MANAGER: N. M. Coleman

BUDGET AMOUNT: \$ 46K

CONTRACT PROGRAM MANAGER: R. M. Cranwell

FTS PHONE: 844-8368

PRINCIPAL INVESTIGATOR: C. P. Harlan

FTS PHONE: 844-8164

PROJECT OBJECTIVE

To implement a quality assurance program to maintain computer codes, report errors, document changes, and inform the NRC staff.

ACTIVITIES DURING OCTOBER 1987

Routine maintenance was performed on the QUALIB system. All on-line documentation at INEL was expanded to include a "last update" date to the documentation. The purpose is to provide user's with information on when the last change has occurred to documentation on each code. A sample of one of the on-line documentation files and a current directory of the user area CRH are enclosed. Routine backups of system changes were also made. Eleven computer codes and their associated data files and procedures are being maintained on the INEL QUALIB system. These codes are:

- (1) SWIFT
- (2) SWIFT II
- (3) NWFTDVM
- (4) GENNET
- (5) NEFTRAN
- (6) LHS
- (7) DNET
- (8) STEPWISE
- (9) PATH1
- (10) USGS
- (11) TOUGH

Documentation on the implementation of the QA plan, NUREG/CR-4369, at Sandia is being developed by C. P. Harlan and G. F. Wilkinson. This report will discuss the QA plan and how it has been implemented on the Sandia NOS system. In addition, it will provide an overview of how the codes in QUALIB are related to a high-level waste performance assessment and give a brief history and description of each code, along with references to all associated reports, a list of all associated data files, and example execution procedures. It is hoped that this report will be useful to new and existing Sandia staff and contractors in providing them with a history of the codes related to high-level waste management, and also provide them with some usage independence in order to conserve the QA Coordinator's time. A parallel NUREG/CR report for the INEL QUALIB system should be considered for the use of the NRC and their contractors.

FIN A1158, Task II, Maintenance of Computer Codes
 Subcase 0976.030
 OCTOBER 1987

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date -----
I. Direct Manpower (man-months of charged effort)	0.6 ---	0.6 ---
II. Direct Loaded Labor Costs	5	5
Materials and Services	0	0
ADP Support (computer)	0	0
Subcontracts	0	0
Travel	0	0
Other (computer roundoff)	1	1
G & A	1 ---	1 ---
TOTAL COSTS	7	7

III. Funding Status

Prior FY Carryover -----	FY 88 Projected Funding Level -----	FY 88 Funds Received to Date -----	FY 88 Funding Balance Needed -----
\$ 46K	\$ 46K	\$ 0K	\$ 0K

PROGRAM: Task III, Code Validation and Verification

FIN A1158

CONTRACTOR: Sandia National Laboratories

BUDGET PERIOD: 10/87 -
12/87

NMSS PROGRAM MANAGER: N. M. Coleman

BUDGET AMOUNT: \$ 0K

CONTRACT PROGRAM MANAGER: R. M. Cranwell

FTS PHONE: 844-8368

PRINCIPAL INVESTIGATOR: C. P. Harlan

FTS PHONE: 844-8164

PROJECT OBJECTIVE

To assemble the various tests that have been performed to help validate and verify various portions of relevant codes and recommend any additional feasible tests.

ACTIVITIES DURING OCTOBER 1987

No activity. Task III is complete.

FIN A1158, Task III, Code Validation and Verification
 Subcase 0976.040
 OCTOBER 1987

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date -----
I. Direct Manpower (man-months of charged effort)	0.0 ---	0.0 ---
II. Direct Loaded Labor Costs	0	0
Materials and Services	0	0
ADP Support (computer)	0	0
Subcontracts	0	0
Travel	0	0
Other (computer roundoff)	0	0
G & A	0	0
	-----	-----
TOTAL COSTS	0	0

III. Funding Status

Prior FY Carryover -----	FY 88 Projected Funding Level -----	FY 88 Funds Received to Date -----	FY 88 Funding Balance Needed -----
\$ OK	\$ OK	\$ OK	\$ OK

PROGRAM: Task IV, T. A. in Numerical Modeling

FIN A1158

CONTRACTOR: Sandia National Laboratories

BUDGET PERIOD: 10/87 -
12/87

NMSS PROGRAM MANAGER: N. M. Coleman

BUDGET AMOUNT: \$11K

CONTRACT PROGRAM MANAGER: R. M. Cranwell

FTS PHONE: 844-8368

PRINCIPAL INVESTIGATOR: C. P. Harlan

FTS PHONE: 844-8164

PROJECT OBJECTIVE

Provide expert opinion input to NRC reviews of DOE site screening, site characterization, and technical development programs. Work includes numerical modeling assessments and participation in technical meetings, site visits and workshops.

ACTIVITIES DURING OCTOBER 1987

Paul Davis' travel charged to this project during October is for the A1158 Program Review given to the NRC at Silver Spring on September 3, 1987. A trip report was provided in the August progress report.

During October, work continued on the BWIP report. Some of the figures have been re-submitted to Tech Reps for modifications after initial review. Sandia has not yet received comments from Nuclear Waste Consultants. The BWIP report has been submitted for Sandia peer review.

FIN A1158, Task IV, T. A. in Numerical Modeling
 Subcase 0976.060
 OCTOBER 1987

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date -----
I. Direct Manpower (man-months of charged effort)	0.0 ---	0.0 ---
II. Direct Loaded Labor Costs	0	0
Materials and Services	0	0
ADP Support (computer)	0	0
Subcontracts	0	0
Travel	1	1
Other (computer roundoff)	0	0
G & A	0	0
	-----	-----
TOTAL COSTS	1	1

III. Funding Status

Prior FY Carryover -----	FY 88 Projected Funding Level -----	FY 88 Funds Received to Date -----	FY 88 Funding Balance Needed -----
\$ 11K	\$ 11K	\$ 0K	\$ 0K

PROGRAM: Task V, Short-term Technical Assistance

FIN A1158

CONTRACTOR: Sandia National Laboratories

BUDGET PERIOD: 10/87 -
12/87

NMSS PROGRAM MANAGER: N. M. Coleman

BUDGET AMOUNT: \$25K

CONTRACT PROGRAM MANAGER: R. M. Cranwell

FTS PHONE: 844-8368

PRINCIPAL INVESTIGATOR: C. P. Harlan

FTS PHONE: 844-8164

PROJECT OBJECTIVE

To provide general technical assistance on waste management matters relating to Tasks I, II, III, and IV.

ACTIVITIES DURING OCTOBER 1987

No activity.

FIN A1158, Task V, Short-term Technical Assistance
 Subcase 0976.050
 OCTOBER 1987

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date -----
I. Direct Manpower (man-months of charged effort)	0.0 ---	0.0 ---
II. Direct Loaded Labor Costs	0	0
Materials and Services	0	0
ADP Support (computer)	0	0
Subcontracts	0	0
Travel	0	0
Other (computer roundoff)	0	0
G & A	0	0
	-----	-----
TOTAL COSTS	0	0

III. Funding Status

Prior FY Carryover -----	FY 88 Projected Funding Level -----	FY 88 Funds Received to Date -----	FY 88 Funding Balance Needed -----
\$ 25K	\$ 25K	\$ 0K	\$ 0K

FIN A1158
 Total for Case 0976.000
 OCTOBER 1987

THIS IS AN ESTIMATE ONLY AND MAY NOT MATCH THE INVOICES SENT TO NRC BY SANDIA'S ACCOUNTING DEPARTMENT.

	Current Month -----	Year -to- Date -----
I. Direct Manpower (man-months of charged effort)	0.6 -----	0.6 -----
II. Direct Loaded Labor Costs	6	6
Materials and Services	0	0
ADP Support (computer)	0	0
Subcontracts	0	0
Travel	1	1
Other (computer roundoff)	1	1
G & A	1 -----	1 -----
TOTAL COSTS	9	9

III. Funding Status

Prior FY Carryover -----	FY 88 Projected Funding Level -----	FY 88 Funds Received to Date -----	FY 88 Funding Balance Needed -----
\$ 82K	\$ 82K	\$ 0K	\$0K

QUALIB DOCUMENTATION ON SWIFT II AS OF OCT 1, 1987:

SWIFT II INTERNAL DOCUMENTATION:

```
*****
*
*   CODE NAME       -   SWIFT II
*
*   VERSION        -   RELEASE 4.84
*
*   DESCRIPTION    -   SWIFT II (SANDIA WASTE-ISOLATION, FLOW
*                       AND TRANSPORT MODEL) IS A DUAL POROSITY
*                       FULLY TRANSIENT 3D MODEL WHICH SOLVES
*                       THE COUPLED EQUATIONS FOR FLUID FLOW,
*                       HEAT TRANSPORT, BRINE TRANSPORT, AND
*                       RADIONUCLIDE TRANSPORT.  THE FIRST THREE
*                       PROCESSES ARE COUPLED VIA FLUID DENSITY
*                       AND VISCOSITY.  TOGETHER THEY PROVIDE
*                       THE VELOCITY FIELD ON WHICH THE FOURTH
*                       PROCESS DEPENDS.
*
*   LANGUAGE       -   ANSI STANDARD FORTRAN, VERSION 66
*
*   HARDWARE      -   CDC CYBER 76 SERIES MACHINES
*
*   LIBRARIES     -   NONE USED
*
*   EVOLUTION     -   INTERA TECHNOLOGIES, INC.  1975-1982
*                       GEOTRANS, INC.  1982-1984
*
*   DOCUMENTATION -   (1) THEORY AND IMPLEMENTATION
*                       NUREG/CR-3328, SAND83-1159
*                       (2) DATA INPUT GUIDE
*                       NUREG/CR-3162, SAND83-0242
*                       (3) SELF-TEACHING CURRICULUM
*                       NUREG/CR-3925, SAND84-1586
*
*   SANDIA CONTACTS - PAUL A. DAVIS
*                       CHARLENE L. HARLAN
*                       GINGER F. WILKINSON
*
*****
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SWIFT II FILES:

```
SWIFTII - SWIFT II (VERSION 4.84) UPDATE FORMAT
SWIICMP - SWIFT II COMPILE FILE
SWIILGO - SWIFT II COMPILED BINARIES
SWII01  - SWIFT II SELF TEACHING CURRICULUM PROBLEM 1
SWII02  - SWIFT II SELF TEACHING CURRICULUM PROBLEM 2
SWII03  - SWIFT II SELF TEACHING CURRICULUM PROBLEM 3
SWII04  - SWIFT II SELF TEACHING CURRICULUM PROBLEM 4
SWII05  - SWIFT II SELF TEACHING CURRICULUM PROBLEM 5
SWII06  - SWIFT II SELF TEACHING CURRICULUM PROBLEM 6
SWII07  - SWIFT II SELF TEACHING CURRICULUM PROBLEM 7
SWII08  - SWIFT II SELF TEACHING CURRICULUM PROBLEM 8
SWIIDOC - FILE CONTAINING DOCUMENTATION ON SWIFTII
SWIIDIM - PROCEDURE TO RE-DIMENSION SWIFTII
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SWIFT II EXECUTION PROCEDURE - INTERACTIVE EXAMPLE USING SWII01

ATTACH,SWIILG	=CRH	(ATTACH THE EXECUTABLE BINARIES)
GET,TAPE5=SWIILGO	/UN=CRH	(EQUIVALENCE SWIIO1 TO TAPE5)
RFL,0,472		(REQUEST EXTENDED MEMORY)
LDSET,PRESET=0		(INVOKE THE LOADER AND PRESET CORE)
SWIILGO,TAPE5,TAPE6		(PROVIDE LOADER WITH NAME OF BINARIES)
.		.
.		(EXECUTION IN PROGRESS)
.		.
RFL,0		(RELEASE EXTENDED MEMORY WHEN COMPLETED)
RETURN,*,TAPE6		(RELEASE ALL FILES EXCEPT OUTPUT TAPE6)

SWIFT II EXECUTION PROCEDURE - BATCH EXAMPLE USING SWIIO1:

- (1) CREATE ONE FILE CONTAINING THE FOLLOWING RECORDS.
SAVE THE FILE UNDER SOME NAME, FOR EXAMPLE, 'MYJOB'.

```

/JOB
XYZ.                (XYZ IS YOUR USERID)
/USER
CHARGE,123456789,X. (ENTER YOUR CHARGE NUMBER)
/NOSEQ
ATTACH,SWIILGO/UN=CRH.
RFL(EC=472).
LDSET,PRESET=0.
SWIILGO.
/EOB

```

(SWIIO1 DATA SET)

```

/EOB
/EOF

```

- (2) HOW TO SUBMIT YOUR BATCH JOB DURING AN INTERACTIVE SESSION:

```

GET,MYJOB
SUBMIT,MYJOB,TO
  (BATCH SYSTEM RESPONDS WITH 'JSN IS ABCD'
  WHERE ABCD IS YOUR SYSTEM JOB NAME)
ENQUIRE,JSN=ABCD (TO ENQUIRE ON PROGRESS)
QGET,ABCD (TO PULL OUTPUT INTO YOUR LOCAL
  AREA AFTER ENQUIRE SHOWS WAIT QUEUE)

```

PROCEDURE TO RE-DIMENSION SWIFT II FOR LARGER PROBLEMS

- (1) EXAMINE PAGE 5 OF OUTPUT FILE FOR A TABLE ENTITLED 'UTILIZATION OF COMMON ARRAY STORAGE'
- (2) COMPARE CURRENT CORE DIMENSIONS WITH YOUR DATA REQUIREMENTS FOR ARRAYS G, G2, G3, AND IG.
- (3) CREATE AND SAVE YOUR OWN BINARIES WITH THE FOLLOWING INTERACTIVE CONTROL STREAM:
 - (A) GET,SWIIDIM/UN=CRH
 - (B) BEGIN,,SWIIDIM (THIS PROCEDURE PROMPTS YOU FOR SIZES)
 - (C) DEFINE,MYLGO (SELECT A NAME FOR BINARIES, EX, MYLGO)
 - (D) COPYBF,LGO,MYLGO (SAVE YOUR BINARIES IN YOUR AREA)
 - (E) ROUTE,MYLIST,DC=PR,ST=M01,UN=NRC,UJN=XYZ.
(WHERE XYZ IS YOUR USERID. WARNING - THIS ROUTE IS OPTIONAL AND SENDS A VERY LARGE COMPILER LISTING TO YOUR PRINTER)
- (4) USE YOUR BINARY FILE MYLGO IN PLACE OF THE LIBRARY BINARY FILE SWIILGO.
- (5) THE REQUEST FOR EXTENDED MEMORY AT EXECUTION TIME SHOULD BE INCREASED TO REFLECT THE ADDED MEMORY. AN ESTIMATE OF

THIS NUMBER IS PRINTED OUT FROM THE PROCEDURE IN STEP (3).
AS AN EXAMPLE, THE RFL,0,472 REQUIREMENTS FOR THE QA VERSION
OF SWIFT II WERE DETERMINED BY:

G ARRAY G2 ARRAY G3 ARRAY IG ARRAY
48000 + 30000 + 58000 + 20000 = 156000

(6) INEL SYSTEM LIMITATIONS:

- (A) A SINGLE COMMON BLOCK SIZE IS 131071 MAXIMUM
- (B) THE TOTAL OF ALL FOUR ARRAY SIZES MUST NOT EXCEED
262144 (1000K OCTAL)

PROCEDURE TO GET A HARDCOPY OF THIS DOCUMENTATION:

GET,SWIIDOC/UN=CRH

(SEND THIS FILE TO YOUR PRINTER)

END OF FILE

/DIR
UN=CRH

UI=3114 FAMILY=INEL 87/11/02. 10.37.31.

*A42292	DNETCMP	DNETDOC	DNETLGO	DNET01	DNET02	DNET03
DNET04	DNET05	FLECSLG	GENCMP	GENDOC	GENLGO	GEN01
GEN02	GEN03	GEN04	*LHSCMP	LHSDOC	LHSLGO	LHS01
LHS02	*NEFTCMP	NEFTDOC	NEFTLGO	NEFT01	NEFT02	NEFT03
NEFT04	NEFT05	NEFT06	NEFT07	NEFT08	NWFTCMP	NWFTDOC
NWFTLGO	NWFT01	NWFT02	NWFT03	NWFT04	PATHCMP	PATHDOC
PATHLGO	PATH01	PATH02	PATH03	PATH04	PATH05	PATH06
QUAHELB	QUAHELP	QUAHEL5	STEPCMP	STEPDOC	STEPLGO	STEP01
*SWICMP	SWIDOC	*SWIFTII	*SWIICMP	SWIIDIB	SWIIDIM	SWIIDOC
*SWIILGO	SWII01	SWII02	SWII03	SWII04	SWII05	SWII06
SWII07	SWII08	SWILGO	SWI01	SWI02	SWI03	SWI04
SWI05	SWI06	SWI07	SWI08	SWI09	SWI10	SWI11
SWI12	SWI13	SWI14	SWI15	SWI16	SWI17	SWI18
SWI19	SWI20	SWI21	SWI22	SWI23	SWI24	SWI25
SWI26	SWI27	SWI28	SWI29	SWI30	SWI31	SWI32
SWI33	SWI34	SWI35	SWI36	SWI37	SWI38	SWI39
SWI40	SWI41	SWI42	SWI43	SWI44	SWI45	SWI46
SWI47	SWI48	SWI49	SWI50	SWI51	SWI52	SWI53
SWI54	SWI55	SWI56	SWI57	SWI58	SWI59	TOUGDOC
TOUGH	TOUGHB	TOUGH01	TOUGH02	TOUGH03	TOUGH04	TOUGH05
TOUGH06	*USGS	USGSDOC	USGSLGO	USGSUPD	USGS01	USGS02
USGS03	USGS04	OBIN				

142 IND. 7741 PRUS. 7741 ALLOCATED. \$4.71+/DAY.
8 (*)DIR. 10252 PRUS. 13440 ALLOCATED. \$8.67+/DAY.

WM DOCKET CONTROL
CENTER

'87 NOV 30 P4:41

WM-Res
WM Record File
A1158
SNH

WM Project 10, 11, 16
Docket No. _____

PDR ✓
XLPDR ✓ (B, A, S)

Distribution:

Coleman * Joan-ticket

WM, 623-SS)